UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
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NOTICE OF RELEASE OF US-1136, US-1137, AND US-1138 COWPEA GERMPLASM LINES WITH POTENTIAL FOR USE AS A COVER CROP

The Agricultural Research Service, U.S. Department of Agriculture, announces the release of the cowpea [Vigna unguiculata (L.) Walp.] germplasm lines US-1136, US-1137, and US-1138. The three newly released lines have vigorous, indeterminate-type plant habits, relatively short photoperiods, are resistant to root knot nematode, do not produce seeds with impermeable seed coats, and are high biomass producers. The release of these lines should be particularly useful for researchers interested in developing improved sustainable and organic agriculture cropping systems that utilize cover crops or cover crop mulches. Cowpeas are desirable as a cover crop because they are tolerant of heat, drought and poor soils, grow vigorously, and compete well against weeds. These lines were developed at the U.S. Vegetable Laboratory, Charleston, S.C., by Dr. Howard F. Harrison, Jr., Research Agronomist; Dr. Richard L. Fery, Supervisory Research Geneticist; and Dr. Judy A. Thies, Research Plant Pathologist, in cooperation with Dr. J. Powell Smith, South Carolina Agricultural Extension Service, Clemson University, Lexington, S.C.

In 1997, field screening trials were initiated to identify cowpea populations suitable for use as a cover crop. The forty-seven populations in the initial studies included cultivars, germplasm accessions, and land races. After the preliminary field studies were completed, eleven populations were selected for more detailed evaluation. After three additional years of evaluation, eight of the eleven populations were eliminated due to poor seed quality, production of seeds with impermeable (hard) seed coats, or disease susceptibility. The remaining three populations were identified as having potential for use as a cover crop. All three populations are heterogeneous land races that were collected in South Carolina.

Since the three land race populations were considered too heterogeneous for release, a pure-line selection procedure was initiated to develop homogeneous lines. In 2006, the land race populations were grown in a field planting, and three typical plants from each population were selected. In a 2007 field planting, the original three land race populations and the progenies of the three plants selected from each of the original populations were carefully evaluated for the following traits: rapid growth, good vigor, indeterminate growth habit, canopy height, and high seed quality. A single progeny population was selected from each of the original land race populations as a candidate for release as a germplasm line. In 2008, each of the candidate germplasm lines was planted in two separate field plantings. The purpose of the first planting was to collect detailed descriptor information about individual plant growth characteristics, and the purpose of the second planting was to harvest breeder's seed.

The three newly-released lines have relatively short photoperiods; flowering does not begin until day length is approximately 13 hours, and flowering and pod set continue in an indeterminate

manner until plants senesce in late autumn or are killed by frost. The lines are homozygous for all important agronomic traits. They are resistant to the southern root knot nematode [Meloidogyne incognita (Chitwood) Kofoid and White] (many horticultural type cultivars are susceptible), and grow well without nitrogen fertilization. Iron Clay and other forage cowpea genotypes produce seeds with an impermeable seed coat. This trait enables viable seeds to overwinter in the soil, germinate the following spring, and become a weed in subsequent crops. The newly-released lines produce good quality seeds with high germination rates (>95 percent) and do not produce seeds with impermeable seed coats. The adoption of these lines for use as a cover crop will eliminate the weed problem caused by dormant cowpea seeds.

US-1136 is derived from land race population Hardee (USVL Accession 698). A typical pod is 24 cm long with 14 seeds. Coats of dried seeds have a smooth to wrinkled texture and red color. Seed size is large with a weight of 22.1 g per 100 dry seeds, and dry seeds have an ovoid shape. US-1136 plants grown for 12 weeks without competition from neighboring plants reached an average height of 32 cm, shoot dry of 2.6 kg per plant, and plant spread of 3.4 m with high twining vine production.

US-1137 is derived from land race population Graham #1 (USVL Accession 697). A typical pod is 23 cm long with 18 seeds. Coats of dried seeds have a smooth texture and a fine buff to brown and black speckling pattern. Seed size is medium with a weight of 16.7 g per 100 dry seeds, and dry seeds have an ovoid to rhomboid shape. US-1137 plants grown for 12 weeks without competition from neighboring plants reached an average height of 36 cm, shoot dry weight of 2.4 kg per plant, and plant spread of 3.0 m with moderate twining vine production.

US-1138 is derived from land race population Tyler (USVL Accession 735). A typical pod is 20 cm long with 18 seeds. Coats of dry seeds have a smooth to rough texture and buff to brown color. Seed size is small with a weight of 12.6 g per 100 dry seeds, and dry seeds have an ovoid shape. US-1138 plants grown for 12 weeks without competition from neighboring plants reached an average height of 52 cm, shoot dry of 1.4 kg per plant, and plant spread of 2.7 m with high twining vine production.

Harrison et al. (HortScience 41:1145-1148. 2006) evaluated each of the original three land race populations for use as a cover crop. They reported that each of these populations has a vigorous, relatively upright growth habit, and is a high biomass producer. They also reported: 1) the indeterminate plant habits of the land race populations were more competitive against weed populations than the determinate plant habit typical of horticultural-type cowpea cultivars, and 2) the nitrogen content of cowpea shoots determined 10 weeks after planting ranged between 2.4 percent and 3.0 percent of dry weight. Harrison et al. (HortTechnology 14:484-487, 2004) studied broccoli production in cowpea cover crop mulch, and they reported that broccoli grown in mulched plots exhibited higher yields than broccoli grown on bare soil plots. They also reported that the mulch persisted through the growing season and suppressed annual weeds.

Each of the newly released germplasm lines is recommended for use by researchers interested in developing cropping systems that incorporate the use of a warm season legume cover crop. A legume cover crop can be used as an alternative to nitrogen fertilizers. Additionally, a legume cover crop can be left on the soil surface to serve as mulch for subsequent crops. Cover crop

mulches positively affect pest management by suppressing weeds and other pests and reducing runoff or groundwater infiltration of pesticides and nutrients.

Samples of seeds of US-1136, US-1137, and US-1138 are available for distribution to all interested research personnel. Address all requests to Dr. Howard F. Harrison, 2700 Savannah Highway, Charleston, SC 29414-5334. Genetic material of these releases will be deposited in the National Plant Germplasm System where it will be available for research purposes, including the development and commercialization of new cultivars. It is requested that appropriate recognition of source be given when this germplasm contributes to research or development of a new breeding line or cultivar.

Signature:

T Simmons

Deputy Administrator, Crop Production and Protection
Agricultural Research Service, U.S. Department of Agriculture

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Date